

CLAIMS

1/ A guide device (3) for an off-shore drilling installation comprising at least one drilling riser (2) extending from a floating support (1) to said guide device (3) on the sea bottom (4), said drilling being performable from said floating support using a drill string (38) fitted at its end with drilling tools (36) passing through said drilling riser (2) and said guide device (3), said guide device (3) being characterized in that it comprises a telescopic guide pipe (3) comprising coaxial telescopic guide elements (3a, 3b, 3c) about an axis XX' and of decreasing diameters, the elements being preassembled one in another in such a manner that said telescopic pipe elements are suitable for sliding in the direction of said axis XX' one inside another, the smallest diameter, innermost telescopic pipe element (3c) being fitted at its end with breakup means (35) for breaking up the ground suitable for enabling said telescopic guide pipe (3) to be progressively buried in the ground by sliding said telescopic pipe elements (3a, 3b, 3c) outwards, thereby enabling a drilling tool (36) at the end of said drill string (38) to be guided more deeply in the ground.

2/ A guide device according to claim 1, characterized in that said smallest-diameter innermost pipe element (3c) presents a diameter substantially equal to the diameter of said drilling riser (2).

3/ A guide device according to claim 1 or claim 2, characterized in that said means (35) for breaking up the ground are constituted by a multiply-perforated capsule enabling water or mud to be jettied into the ground by being injected under very high pressure.

4/ A guide device according to any one of claims 1 to 3, characterized in that it has at least three coaxial telescopic pipe elements (3a, 3b, 3c).

5 5/ A device according to any one of claims 1 to 4, characterized in that each of said telescopic coaxial pipe elements (3a, 3b, 3c) presents a length of 50 m to 300 m, preferably of 100 m to 200 m, said deployed guide pipe presenting a length of 150 m to 600 m, and
10 preferably of 200 m to 300 m.

6/ A guide device (3) according to any one of claims 1 to 5, characterized in that it comprises a said telescopic guide pipe (3) suitable for use in an off-shore drilling installation, in which at least one drilling riser (2) extends from a floating support (1) to a said guide device (3) at the sea bottom (4), said drilling riser (2) deflecting progressively from a substantially vertical position (2a) at said floating support (1) to a position
15 that is substantially horizontal or tangential to the horizontal (2b) at the sea bottom (4), said drilling being performable from said floating support via said drilling riser (2) and said guide device (3) in such a manner that the borehole in the sea bottom is begun at a
20 given angle of inclination α relative to the horizontal that preferably lies in the range 5° to 60° , and more preferably in the range 25° to 45° , said guide device (3) being characterized in that it comprises a said telescopic guide pipe (3) in a buried position (A2) in
25 which said telescopic guide pipe (3) in the retraced position or the outer telescopic pipe element (3a) when said telescopic pipe (3) is deployed, comprises in succession:
30 - a front end (3₁) resting substantially horizontally on the sea bottom;
35 - a curved intermediate portion (3₂) buried in the subsoil of the sea bottom with a large radius of

curvature (R), preferably a radius of curvature greater than 500 m; and

5 - a rear portion (3₃) that is substantially linear and buried in the subsoil of the sea bed at said given angle of inclination α ;

said telescopic guide pipe (3) or said outer telescopic element (3a) co-operating with controlled burying means (3₄, 5₁-5₃, 7₁-7₃, 8-9, 13) enabling said retracted telescopic guide pipe (3) to be buried in the sea bottom

10 while said retracted telescopic guide pipe (3) is being towed (T) along the sea bottom from its front end (3₁), starting from an initial position (A1) in which said retracted telescopic guide pipe (3) rests entirely on the sea bottom in a substantially horizontal position, to a

15 said buried position (A2) in the subsoil of the sea bottom.

7/ A guide device according to claim 6, characterized in that said retracted telescopic guide pipe (3) presents a length of 100 m to 600 m, preferably of 250 m to 450 m, with a said given angle of inclination α of the guide pipe lying in the range about 10° to 60°, and preferably in the range 25° to 45°.

25 8/ A guide device according to claim 6 or claim 7, characterized in that said front end (3₁) is engaged in a baseplate (6) including a load and resting on a front soleplate (5₁) such that said baseplate (6) maintains said front end (3₁) substantially horizontally on the sea

30 bottom while it is being towed (T).

9/ A guide device according to any one of claims 6 to 8, characterized in that said controlled burying means comprise:

35 - a front soleplate (5₁) placed on the sea bottom and supporting said front end (3₁) and secured thereto;

- at least one intermediate soleplate (5₂, 5₃) supporting said curved intermediate portion (3₂) and/or the rear portion (3₃) and secured thereto, of surface area that is smaller than that of said front soleplate (5₁),
- 5 preferably a plurality of said intermediate soleplates (5₂, 5₃) distributed along said intermediate portion (3₂) and said rear portion (3₃) of surface area that becomes smaller relative to said front soleplate on approaching said rear end (3₃); and
- 10 - an anchor (13) connected (12) to said rear portion (3₃) and suitable for becoming buried in the ground under the effect of said traction applied to said front end (3₁).
- 15 10/ A guide device according to any one of claims 6 to 9, characterized in that said controlled burying means comprise at least one deflector (7₁, 7₂, 7₃) secured to said outer telescopic pipe element (3a) of said telescopic guide pipe (3) in said intermediate portion (3₂) or said rear portion (3₃) of said retracted telescopic guide pipe, comprising plane surfaces that are preferably symmetrical about a vertical axial plane (XX', YY') of said guide pipe in the longitudinal direction when it is in a rectilinear horizontal position, and said plane and deflector surfaces being inclined relative to a horizontal axial plane (XX', ZZ') of said guide pipe when it is in a horizontal position on the sea bottom, said deflector (7₁, 7₂, 7₃) being inclined at an angle (α₁, α₂, α₃) in such a manner as to cause said retracted telescopic
- 20 30 guide pipe (3) to become buried when it is towed from said substantially horizontal initial position (A1) to a said buried position (A2) in the sea bottom.
- 25 35 11/ A guide device according to claim 10, characterized in that it has a plurality of deflectors (7₁, 7₂, 7₃) distributed along the outer telescopic pipe element (3a) of said telescopic guide pipe, said deflectors being

inclined at respective angles (α_1 , α_2 , α_3) that become smaller for said deflectors (7_1 , 7_2 , 7_3) that are closer to said front end (3_1).

5 12/ A guide device according to any one of claims 1 to 11, characterized in that said controlled burying means comprise:

- secondary pipes (8) for jetting fluid (18) and secured to said telescopic guide pipe (3), extending

10 parallel thereto along the underface thereof; and

- said secondary pipes (8) being of smaller diameter than said telescopic guide pipe (3) and having perforations (9) in their underfaces enabling a fluid (18) to be expelled towards the sea bottom when said 15 secondary pipes (8) are fed by a said fluid (18) under pressure.

13/ A guide device according to claim 12, characterized in that said secondary pipes (8) are connected via their 20 ends (8_1 , 8_2) to the front and rear ends (3_1 , 3_3) of said retracted telescopic guide pipe (3), communicating with said front and rear ends (3_1 , 3_3) in such a manner as to make it possible to feed them using a single feed pipe (19) connected to said front end (3_1) of said guide pipe 25 (3).

14/ A device according to any one of claims 1 to 13, characterized in that the guide device comprises:

- a rigid outer top structure (20) covering and 30 holding rectilinear said retracted telescopic guide pipe (3) when it is substantially horizontal and rests on the sea bottom;

- said outer structure (20) presenting a longitudinal central opening in its bottom face enabling 35 said retracted telescopic guide pipe (3) to become buried in the ground when it is towed (T);

- at least one connection (17₁, 17₂, 17₃) connecting at least the rear portion (3₃) of the outer telescopic pipe element (3a) of the telescopic guide pipe (3) to said outer structure (20) in such a manner as to prevent 5 it from becoming buried beyond a given depth so as to limit the radius of curvature (R) of said curved portion;

- said outer top structure (20) resting on the ground of the sea bottom (4), preferably via lateral soleplates (21) situated on either said longitudinal 10 central opening (22), said lateral soleplates (21) preventing said rigid outer structure (20) from becoming buried; and

- said outer structure (20) being secured to said baseplate (6) in which said front portion (3₁) of the 15 guide pipe (3) is engaged.

15/ A guide device according to claim 14, characterized in that it has a plurality of flexible connections (17₁, 17₂, 17₃) distributed along the outer telescopic pipe 20 element (3a) of said telescopic guide pipe (3) and presenting lengths that become longer for connections that are closer to the rear end (3₃) of the guide pipe (3) and of lengths that are such that said guide pipe presents a said curved portion having a desired radius of 25 curvature (R) and a said rear portion (3₃) that is linear.

16/ A method of making a guide device according to claims 6 to 15, characterized in that the following steps are performed:

30 - placing a said telescopic guide pipe in the retracted position (3) in a said initial position (A1) where it rests substantially horizontally and in rectilinear manner on the sea bottom, said telescopic guide pipe (3) co-operating with said controlled burying 35 means (3₄, 5₁-5₃, 7₁-7₃, 8-9, 13); and

- towing (T) the front end (3₁) of said telescopic guide pipe (3) in the retracted position along the sea

bottom, preferably in the axial longitudinal direction XX' of said guide pipe, from said initial position (A1) to a said buried position (A2).

5 17/ A method of making a guide device according to claim 16, characterized in that guide devices according to claim 8 or claim 9 are used and the front end (3₁) of said retracted telescopic guide pipe (3) is towed (T) until said intermediate soleplates (5₂, 5₃) are buried in the 10 ground at increasing depth on coming closer to the rear end (3₃) of the guide pipe so as to obtain the desired radius of curvature (R), preferably greater than 500 m, and more preferably lying in the range 500 m to 1000 m.

15 18/ A method of making a guide device according to claim 16 or claim 17, characterized in that a guide device according to claim 10 or claim 11 is used and the front end (3₁) of said retracted telescopic guide pipe (3) is towed (T) until said deflectors (7₁, 7₂, 7₃) are buried in the 20 ground in a horizontal position so as to obtain a said desired radius of curvature preferably greater than 500 m, and more preferably lying in the range 500 m to 1000 m.

25 19/ A method of making a guide device according to any one of claims 16 to 18, characterized in that a guide device is used according to claim 12 or claim 13, and:

- injecting gas under pressure into said secondary pipes (8) when it is desired to tow said guide pipe (3) on the sea bottom; and
- injecting a liquid under pressure, preferably water, into said secondary pipes (8) and preferably into said telescopic guide pipes (3) closed at both ends (3₁, 3₂) and communicating with said ends (8₁, 8₂) of said 30 secondary pipes (8) when it is desired to bury said guide pipe (3).

20/ A method of making a guide device according to any one of claims 16 to 19, characterized in that a guide device is used according to claim 14 or claim 15, and the front end (3₁) of said retracted telescopic guide pipe (3) and said rigid outer structure (20) secured to said guide pipe are towed (T) until said connection(s) (17₁-17₃) prevent at least said rear portion (3₃) of said retracted telescopic guide pipe (3) from becoming buried deeper so as to obtain the desired radius of curvature (R) 5 preferably greater than 500 m, and more preferably lying 10 in the range 500 m to 1000 m.

21/ An off-shore drilling installation comprising a drilling riser (2) extending from a floating support to a 15 said guide device (3) according to any one of claims 1 to 15, to which said drilling riser (2) is connected.

22/ An off-shore drilling installation according to claim 21, comprising a drilling riser (2) extending from a 20 floating support (1) to a guide device (3) according to any one of claims 6 to 5, to which said drilling riser is connected, said drilling riser (2) deflecting progressively from a substantially vertical position (2a) at said floating support (1) to a position that is 25 substantially horizontal or tangential to the horizontal (2b) at the sea bottom, drilling being performable from said floating support (1) via said drilling riser (2) and said guide device (3) in such a manner that a borehole begins in the sea bottom at a given angle of inclination 30 α relative to the horizontal, preferably lying in the range 10° to 80°.

23/ A method of making a drilling installation according to claim 21 or claim 22, characterized in that the 35 following steps are performed:

- making a guide device according to a method according to any one of claims 16 to 20; and

- connecting at least one said drilling riser (2) to said front end (3₁) of the guide pipe resting on the sea bottom (4).

5 24/ A method of drilling using a drilling installation according to claim 21 or claim 22, characterized in that drilling operations are performed and a borehole is constructed by deploying drill strings co-operating with drilling tools and columns of tubing via a said drilling
10 10 riser (2) and a said guide device (3) buried in the sea bottom (4).